SLOVENSKI STANDARD
oSIST prEN 1991-2:2021

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Evrokod 1 - Vplivi na konstrukcije - 2. del: Prometna obtežba mostov in drugih gradbenih inženirskih objektov

Eurocode 1 - Actions on structures - Part 2: Traffic loads on bridges and other civil engineering works

Eurocode 1 - Einwirkungen auf Tragwerke - Teil 2: Verkehrslasten auf Brücken

Eurocode 1 - Actions sur les structures - Partie 2: Actions sur les ponts et autres ouvrages du génie civil, dues au trafic

Ta slovenski standard je istoveten z: **prEN 1991-2**

ICS:

91.010.30	Tehnični vidiki	Technical aspects
93.040	Gradnja mostov	Bridge construction

oSIST prEN 1991-2:2021 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT prEN 1991-2

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ICS 91.010.30; 93.040

Will supersede EN 1991-2:2003

English Version

Eurocode 1 - Actions on structures - Part 2: Traffic loads on bridges and other civil engineering works

Eurocode 1 - Actions sur les structures - Partie 2: Actions sur les ponts et autres ouvrages du génie civil, dues au trafic

Eurocode 1 - Einwirkungen auf Tragwerke - Teil 2: Verkehrslasten auf Brücken

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 250.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 1991-2:2021) has been prepared by Technical Committee CEN/TC 250 “Structural Eurocodes”, the secretariat of which is held by BSI. CEN/TC 250 is responsible for all Structural Eurocodes and has been assigned responsibility for structural and geotechnical design matters by CEN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 1991-2:2003.

The first generation of EN Eurocodes was published between 2002 and 2007. This document forms part of the second generation of the Eurocodes, which have been prepared under Mandate M/515 issued to CEN by the European Commission and the European Free Trade Association.

The Eurocodes have been drafted to be used in conjunction with relevant execution, material, product and test standards, and to identify requirements for execution, materials, products and testing that are relied upon by the Eurocodes.

The Eurocodes recognize the responsibility of each Member State and have safeguarded their right to determine values related to regulatory safety matters at national level through the use of National Annexes.

Introduction

0.1 Introduction to the Eurocodes

The structural Eurocodes comprise the following standards generally consisting of a number of Parts:

— EN 1990, *Eurocode: Basis of structural and geotechnical design*

— EN 1991, *Eurocode 1: Actions on structures*

— EN 1992, *Eurocode 2: Design of concrete structures*

— EN 1993, *Eurocode 3: Design of steel structures*

— EN 1994, *Eurocode 4: Design of composite steel and concrete structures*

— EN 1995, *Eurocode 5: Design of timber structures*

— EN 1996, *Eurocode 6: Design of masonry structures*

— EN 1997, *Eurocode 7: Geotechnical design*

— EN 1998, *Eurocode 8: Design of structures for earthquake resistance*

— EN 1999, *Eurocode 9: Design of aluminium structures*

— < New parts >

The Eurocodes are intended for use by designers, clients, manufacturers, constructors, relevant authorities (in exercising their duties in accordance with national or international regulations), educators, software developers, and committees drafting standards for related product, testing and execution standards.

NOTE Some aspects of design are most appropriately specified by relevant authorities or, where not specified, can be agreed on a project-specific basis between relevant parties such as designers and clients. The Eurocodes identify such aspects making explicit reference to relevant authorities and relevant parties.

0.2 Introduction to the EN 1991 series

The EN 1991 series provides the actions to be considered for the structural design of buildings, bridges and other civil engineering works, or parts thereof, including temporary structures, in conjunction with prEN 1990 and the other Eurocodes.

The actions on structures, including in some cases geotechnical structures in conjunction with the EN 1997 series as appropriate, provided in the EN 1991 series are intended to be applied in conjunction with the other Eurocodes for the verification of safety, serviceability and durability, as well as robustness of structures, including the execution phase.

EN 1991 does not cover actions for structures in seismic regions, unless explicitly prescribed by the EN 1998 series.

The EN 1991 series is applicable to existing structures for their:

— structural assessment,

— retrofitting (strengthening, repair) design,

— assessment for changes of use.

NOTE 1 In this case, additional or amended provisions can be necessary.

The EN 1991 series is applicable to the design of structures where materials or actions outside the scope of the other Eurocodes are involved.

NOTE 2 In this case additional or amended provisions can be necessary.

0.3 Introduction to prEN 1991-2

prEN 1991-2 gives design guidance and actions due to road and railway traffic on bridges and civil engineering works

prEN 1991-2 is addressed to all parties involved in construction activities (e.g. public authorities, clients, designers, contractors, producers, consultants, committees drafting standards for structural design and related product, testing and execution standards, etc.).

prEN 1991-2 is intended to be used with prEN 1990, the other parts of the EN 1991 series and the EN 1992 series to EN 1999 series for the design of structures.

Additional information specific to prEN 1991-2

prEN 1991-2 defines models of traffic loads for the design of road bridges, footbridges and railway bridges. For the design of new bridges, prEN 1991-2 is intended to be used, for direct application, together with the Eurocodes.

The bases for combinations of traffic loads with non-traffic loads are given in prEN 1990:2021, A.2.

For road bridges, Load Models 1 and 2, defined in 6.3.2 and 6.3.3, and taken into account with adjustment factors α and β equal to 1, are deemed to represent the most severe traffic met or expected in practice, other than that of special vehicles requiring permits to travel, on the main routes of European countries. The traffic on other routes in these countries and in some other countries could be substantially lighter, or better controlled. However it should be noted that a great number of existing bridges do not meet the requirements of this prEN 1991-2 and the associated Structural Eurocode series EN 1992 to EN 1999.

For railway bridges, Load Model 71 (together with Load Model SW/0 for continuous bridges), defined in 8.3.2, represent the static effect of standard rail traffic operating over the standard track gauge or wider than the standard track gauge European railway network. Load Model SW/2, defined in 8.3.3, represents the static effect of heavy rail traffic.

Provision is made for varying the specified loading to cater for variations in the type, volume and maximum weight of rail traffic on different railways, as well as for different qualities of track.

In addition two other load models are given for railway bridges:

— load model “unloaded train” for checking the lateral stability of bridges and

— load model HSLM to represent the loading from passenger trains at speeds exceeding 200 km/h.

Guidance is also given on aerodynamic actions on structures adjacent to railway tracks as a result of passing trains and on other actions from railway infrastructure.

Public authorities could also have responsibilities for the issue of regulations on authorized traffic (especially on vehicle loads) and for delivery and control dispensations when relevant, e.g. for special vehicles.

0.4 Verbal forms used in the Eurocodes

The verb “shall” expresses a requirement strictly to be followed and from which no deviation is permitted in order to comply with the Eurocodes.

The verb “should” expresses a highly recommended choice or course of action. Subject to national regulation and/or any relevant contractual provisions, alternative approaches could be used/adopted where technically justified.

The verb “may” expresses a course of action permissible within the limits of the Eurocodes.

The verb “can” expresses possibility and capability; it is used for statements of fact and clarification of concepts.

0.5 National Annex for prEN 1991-2

National choice is allowed in this document where explicitly stated within notes. National choice includes the selection of values for Nationally Determined Parameters (NDPs).

The national standard implementing prEN 1991-2 can have a National Annex containing all national choices to be used for the design of buildings and civil engineering works to be constructed in the relevant country.

When no national choice is given, the default choice given in this document is to be used.

When no national choice is made and no default is given in this document, the choice can be specified by a relevant authority or, where not specified, agreed for a specific project by relevant parties.

National choice is allowed in EN 1991-2 through notes to the following:

4.3(1)	6.7.3.3(2) – 2 choices	8.4.6.1.2(3)	8.5.4.6
5.2(4)	6.7.3.3(5) – 2 choices	8.4.6.2(1)	8.5.4.6.3(1)
6.1(1)	6.7.3.3(6)	8.4.6.2(2)	8.5.4.6.3(4)
6.1(2)	6.7.3.4	8.4.6.2(7)	8.6.1(5)
6.2.1(1)	6.8(2) – 2 choices	8.4.6.2(8)	8.7.2(2)
6.2.1(2)	6.8(6)	8.4.6.2(9)	8.7.2(7)
6.2.3(1)	6.9.1(1)	8.4.6.3.1(3)	8.7.2(8)
6.3.2(4)	6.9.2(1) – 2 choices	8.4.6.3.2(2)	8.7.4(2)
6.3.2(9)	7.3.3(1)	8.4.6.3.3(4)	8.8.1(1)
6.3.3(1)	7.3.4(4)	8.4.6.3.3(5)	8.8.1(2)
6.3.3(4)	7.4(1)	8.4.6.5(4)	8.8.1(7)
6.3.4(1)	7.6.3(1)	8.4.6.6(4)	8.8.2(3)
6.3.5(1)	8.1(3)	8.4.6.6(6)	8.8.3.1(1)
6.4.1(2)	8.1(7) – 2 choices	8.5.1(2)	8.8.3.2(1)
6.4.1(4)	8.3.2(4)	8.5.1(7)	8.8.4(1)
6.4.2(5)	8.3.3(4)	8.5.1(12)	8.9(2)
6.5.1 – 2 choices	8.3.6.4(5)	8.5.3(10)	8.9(3)
6.5.3(1)	8.3.7(4)	8.5.3(11)	8.9(4)
6.6.1(2) – 2 choices	8.4.4(1)	8.5.3(14)	8.10(1) – 3 choices
6.6.2(2)	8.4.5.2(1)	8.5.4.1(5)	8.10(8)
6.6.4(1)	8.4.5.4(1)	8.5.4.3(1)	C (3) – 2 choices
6.6.7(4)	8.4.6.1.1(2)	8.5.4.3(2) – 2 choices	D.2(2)

6.6.8(2)	8.4.6.1.1(4)	8.5.4.4(3)
6.6.8(5)	8.4.6.1.1(5)	8.5.4.5
6.6.9(1)	8.4.6.1.1(7)	8.5.4.5.1(3) – 2 choices

National choice is allowed in EN 1991-2 on the application of the following informative annexes:

Annex A	Annex B	Annex E	Annex F
Annex G			

The National Annex can contain, directly or by reference, non-contradictory complementary information for ease of implementation, provided it does not alter any provisions of the Eurocodes.

1 Scope

(1) This document defines imposed loads (models and representative values) associated with road traffic, pedestrian actions and rail traffic which include, when relevant, dynamic effects and centrifugal, braking and acceleration actions and actions for accidental design situations.

(2) Imposed loads defined in this document are applicable for the design of new bridges, including piers, abutments, upstand walls, wing walls and flank walls, noise barriers, canopies etc., and their foundations. Where appropriate, the loads can also be considered as a basis for assessment or modification of existing structures in combination with complementary conditions if necessary.

(3) The load models and values given in this document are also applicable for the design of retaining walls adjacent to roads and railway lines and the design of earthworks subject to road or rail traffic actions. This document also provides applicability conditions for specific load models.

(4) This document is intended to be used with prEN 1990, the other parts of the EN 1991 series and the EN 1992 series to EN 1999 series for the design of structures.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE See the Bibliography for a list of other documents cited that are not normative references, including those referenced as recommendations (i.e. in 'should' clauses), permissions ('may' clauses), possibilities ('can' clauses), and in notes.

prEN 1990:2021, *Eurocode: Basis of Structural and Geotechnical Design*

EN 1992 (all parts), *Eurocode 2: Design of concrete structures*

EN 1993 (all parts), *Eurocode 3: Design of steel structures*

EN 1994 (all parts), *Eurocode 4: Design of composite steel and concrete structures*

EN 1995 (all parts), *Eurocode 5: Design of timber structures*

EN 1997 (all parts), *Eurocode 7: Geotechnical design*

EN 1998 (all parts), *Eurocode 8: Design of structures for earthquake resistance*

EN 1999 (all parts), *Eurocode 9: Design of aluminium structures*

EN 15663, *Railway applications — Vehicle reference masses*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 1990 and the following apply.

3.1 Terms and definitions

3.1.1 Harmonized terms and common definitions

3.1.1.1
deck
parts of a bridge which carry the traffic loading over piers, abutments and other walls, pylons being excluded

3.1.1.2
road restraint system
general name for vehicle restraint system and pedestrian restraint system used on the road

Note 1 to entry: Road restraint systems can be, according to use:

— permanent (fixed) or temporary (demountable, *i.e.* they are removable and used during temporary road works, emergencies or similar situations),

— deformable or rigid,

— single-sided (they can be hit on one side only) or double-sided (they can be hit on either side).

[SOURCE: EN 1317-1:2010, definition 4.1]

3.1.1.3
safety barrier
road vehicle restraint system installed alongside, or on the central reserve, of a road

[SOURCE: EN 1317-1:2010, definition 4.3]

3.1.1.4
vehicle parapet
safety barrier installed on the edge, or near the edge, of a bridge or on a retaining wall or similar structure where there is a vertical drop and which can include additional protection and restraint for pedestrians and other road users

[SOURCE: EN 1317-1:2010, definition 4.6]

3.1.1.5
pedestrian restraint system
system installed to provide guidance for pedestrians

[SOURCE: EN 1317-1:2010, definition 4.8]

3.1.1.6
pedestrian parapet
pedestrian or "other user" restraint system along a bridge or on top of a retaining wall or similar structure and which is not intended to act as a road vehicle restraint system

3.1.1.7
noise barrier
screen to reduce transmission of noise

3.1.1.8
footbridge
bridge intended mainly to carry pedestrian and/or cycle-track loads, and on which neither road traffic loads, except those permitted vehicles *e.g.* maintenance vehicles, nor any railway load are permitted

3.1.1.9
civil engineering work
comprising a structure, such as a bridge, road, railway, runway, utilities, or sewerage system, or the result of operations such as earthwork, geotechnical processes, but excluding a building and its associated site works

3.1.2 Terms and definitions specifically for road bridges

3.1.2.1
carriageway
area on the superstructure, that is located between the lesser of the width between kerbs or the inner limits of the vehicle restraint systems

3.1.2.2
hard shoulder
surfaced strip, usually of one traffic lane width, adjacent to the outermost physical traffic lane, intended for use by vehicles in the event of difficulty or during obstruction of the physical traffic lanes

3.1.2.3
hard strip
surfaced strip, usually less than or equal to 2 m wide, located alongside a physical traffic lane, and between this traffic lane and a safety barrier or vehicle parapet

3.1.2.4
central reservation
area separating the physical traffic lanes of a dual-carriageway road

Note 1 to entry: It generally includes a median strip and lateral hard strips separated from the median strip by safety barriers.

3.1.2.5
notional lane
strip of the carriageway, parallel to an edge of the carriageway, which in Clause 6 is deemed to carry a line of cars and/or lorries

3.1.2.6
remaining area
difference, where relevant, between the total area of the carriageway and the sum of the areas of the notional lanes

Note 1 to entry: See Figure 6.1.

3.1.2.7
tandem system
assembly of two consecutive axles considered to be simultaneously loaded

3.1.2.8
abnormal load
vehicle load which may not be carried on a route without permission from the relevant authority

3.1.2.9
kerb
for application of Clauses 6 and 7, a separation line of stone, concrete or another material forming an edge between the carriageway and the adjacent areas (shoulders, islands, cycle ways or footways)

Note 1 to entry: Kerbs can be of upstand type to provide a barrier and discourage vehicles from leaving the carriageway, or be of lower or mountable type which do not provide such barrier

3.1.3 Terms and definitions specifically for railway bridges

3.1.3.1
track
includes rails and sleepers and are laid on a ballast bed or are directly fastened to the decks of bridges

Note 1 to entry: The tracks may be equipped with expansion joints at one end or both ends of a deck. The position of tracks and the depth of ballast may be modified during the lifetime of bridges or for the maintenance of tracks.

3.1.3.2
resonant speed
traffic speed at which a frequency of loading (or a multiple of) matches a natural frequency of the structure (or a multiple of)

3.1.3.3
frequent operating speed
most probable speed at the site for a particular type of Real Train (used for fatigue considerations)

3.1.3.4
maximum line speed at the site
maximum permitted speed of traffic at the site specified for the individual project (generally limited by characteristics of the infrastructure or railway operating safety requirements)

3.1.3.5
maximum permitted vehicle speed
maximum permitted speed of Real Trains due to vehicle considerations and generally independent of the infrastructure

3.1.3.6
maximum nominal speed
generally the Maximum Line Speed at the Site; where specified for the individual project, a reduced speed may be used for checking individual Real Trains for their associated maximum permitted vehicle speed

3.1.3.7
maximum design speed
generally 1,2 × Maximum Nominal Speed